

Advanced Chemistry of Materials

Credits: 3

Lecturers:

Dr. Peng, Shie-Ming 彭旭明 (3/6, 3/13)

Dr. Lu, Kuang-Lieh 呂光烈 (3/20, 3/27)

Dr. Tao, Yu-Tai 陶兩台 (4/10, 4/17)

Mid-term exam 期中考 (4/24)

Dr. Lin, Jiann-T'suen 林建村 (5/1, 5/8, 5/15)

Dr. Chen, Chin-Ti 陳錦地 (5/22, 5/29)

Dr. Sun, Shih-Sheng 孫世勝 (6/5, 6/12)

Final exam 期末考 (6/26)

Classroom: B105, Institute of Chemistry, Academia Sinica

Class hour: 14:00-17:00

Outline:

(1) Basic Concepts

Atomic Structure

Chemical Bonds

Lewis Structure

Molecular Orbital Theory

Special Topic: Metal-Metal Bonding

(2) Sensors

Principle of Sensing

Molecular Design for Recognition and Sensing

Dendrimers and Polymers for Sensing

Application including Biosensors

(3) Supramolecular Materials Chemistry

Introduction to supramolecular chemistry-molecular interactions and basic concepts

Techniques for studying supramolecular materials chemistry

Introduction to molecular photochemistry

Soft materials

Supramolecular Catalysis

(4) Self-assembly of functional materials

Self-assembly and supramolecular chemistry

Supramolecular host-guest interactions

Metallacyclic compounds

Molecular devices and sensors

Crystal engineering: Self-assembly, structures, and applications of metal-organic frameworks

Self-assembly of biomimetic materials

(5) Organic Light-Emitting Diode (OLED) Materials

Development of OLED/LED

Comparison of OLED and Liquid Crystal Display (LCD)

Physical Principle of Devices

Properties of Light-Emitting Materials

Decaying issue of OLED

Efficiency of OLED, Fluorescence and Phosphorescence

Full Color OLED

(6) Organic Thin Films by self-assembly-Structure and applications

Langmuir Monolayers and Langmuir-Blodgett Multilayers

Self-Assembled Monolayers (SAMS) :

->Carboxylic acids on oxide surfaces

->Alkylsilanes on hydroxylated surfaces

->Organothiols on coinage metals

Mixed monolayers

Multilayers

Monolayer-protected clusters(MPCs)

Patterning of surfaces

->Soft lithography

->Dip-pen nanolithography

Sensor applications

Molecular electronics

Others